WHAT IS CLAIMED IS:

1. A method for increasing the surface area of a substrate, comprising the steps of:

(a) placing the substrate in an inert atmosphere having a pressure of between about 10^{-3} torr and about 10^{-2} torr; and

(b) evaporating a valve metal onto the substrate under said inert atmosphere, thereby imparting a surface structure to the substrate.

2. The method of claim 1, wherein said inert atmosphere includes nitrogen.

3. The method of claim 1, wherein said inert atmosphere is anhydrous.

4. The method of claim 1, further comprising the step of:

(c) introducing oxygen into said inert atmosphere prior to said evaporating of said valve metal.

5. The method of claim 4, wherein said oxygen is introduced into said inert atmosphere at a pressure of at most about 1/10 of said pressure of said inert atmosphere.

6. The method of claim 1, further comprising the step of:

(c) heating the substrate to between about 350°C and about 550°C during said evaporating of said valve metal.

7. The method of claim 1, wherein said valve metal is aluminum.

8. The method of claim 1, further comprising the step of:

(c) stabilizing said surface structure.

9. The method of claim 1, further comprising the step of:

(c) anodizing said substrate.

10. A method of forming a dielectric layer on a substrate, comprising the steps of:

(a) forming a discontinuous layer of an oxide of a first valve metal on the substrate; and

(b) electrolytically anodizing the substrate subsequent to said forming of said discontinuous layer.

11. The method of claim 10, wherein said first valve metal is aluminum.

12. The method of claim 10, wherein said forming of said discontinuous layer is effected by evaporating said first valve metal onto the substrate in an oxidizing atmosphere.

13. The method of claim 12, wherein said oxidizing atmosphere includes oxygen at a pressure of between about .0015 torr and about .007 torr.

14. The method of claim 10, wherein said forming of said discontinuous layer is effected by evaporating said oxide directly onto the substrate.

15. The method of claim 10, further comprising the step of:

(c) annealing said discontinuous layer prior to said anodizing.

16. The method of claim 10, further comprising the step of:

(c) thermally oxidizing the substrate subsequent to said forming of said discontinuous layer.

17. The method of claim 10, further comprising the step of:

(c) heating the substrate to between about 350°C and about 500°C during said forming of said discontinuous layer.

18. The method of claim 10, further comprising the step of:

(c) forming a discontinuous layer of an oxide of a second valve metal on the substrate, subsequent to said forming of said discontinuous layer of said oxide of said first valve metal and prior to said anodizing.

19. The method of claim 18, wherein said second valve metal is selected from the group consisting of titanium and tantalum.

20. The method of claim 18, wherein said forming of said discontinuous layer of said oxide of said second valve metal is effected by evaporating said second valve metal onto said substrate in an oxidizing atmosphere.

21. The method of claim 20, wherein said oxidizing atmosphere includes oxygen at a pressure of between about .003 torr and about .007 torr.

22. A method of forming a dielectric layer on a substrate, comprising the steps of:

(a) evaporating onto the substrate a substance selected from the group consisting of valve metals and oxides thereof, thereby:

(i) if said substance is a valve metal, forming a layer of an oxide of said valve metal on the substrate, and

(ii) if said substance is an oxide of a valve metal, forming a layer of said oxide on the substrate;

and

(b) electrolytically anodizing said substrate subsequent to said forming of said oxide layer.

23. The method of claim 22, wherein said substance is aluminum.

24. The method of claim 22, wherein said evaporating is effected in an oxidizing atmosphere.

25. The method of claim 24, wherein said oxidizing atmosphere includes oxygen at a pressure of between about .003 torr and about .007 torr.

26. The method of claim 22, further comprising the step of:

(c) annealing said oxide layer prior to said anodizing.

27. The method of claim 22, further comprising the step of:

(c) thermally oxidizing the substrate subsequent to said forming of said oxide layer.

28. The method of claim 22, further comprising the step of:

(c) heating the substrate to between about 350°C and about 500°C during said evaporating.

29. An article of manufacture comprising a valve metal having a fractal-like surficial structure.

30. The article of manufacture of claim 29, wherein said surficial structure is self-similar between a length scale of between about 2 microns and 0.2 microns.

31. The article of manufacture of claim 29, wherein said valve metal is aluminum.

32. A capacitor comprising the article of manufacture of claim 29.

33. An anodized electrode comprising the article of manufacture of claim 29.

34. An electrode comprising:

(a) an electrically conductive substrate; and

(b) a discontinuous layer, of an oxide of a first valve metal, on a surface of said substrate.

35. The electrode of claim 34, wherein said electrically conductive substrate includes a second valve metal.

36. The electrode of claim 35, wherein said first and second valve metals are identical.

37. The electrode of claim 36, wherein said valve metal is aluminum.

38. An anodized electrode, comprising:

(a) an electrically conductive substrate; and

(b) a dielectric coating, on a surface of said substrate, having a bimodal morphology.

39. The electrode of claim 38, wherein said dielectric coating includes an oxide of a first valve metal.

40. The electrode of claim 38, wherein said electrically conductive substrate includes a second valve metal.

41. The electrode of claim 40, wherein said first and second valve metals are identical.

42. The electrode of claim 41, wherein said valve metal is aluminum.

43. The electrode of claim 38, wherein said dielectric coating includes a plurality of regions of a first morphology embedded in a continuous layer of a second morphology.

44. The electrode of claim 43, wherein said regions are in contact with said substrate.